REMARKS

The applicants appreciate the Examiner's thorough examination of the application and request reexamination and reconsideration of the application in view of the following remarks.

The Examiner rejects claims 1, 3-4 and 13 under 35 U.S.C. §102(e) as allegedly being anticipated by Barth et al. (U.S. Patent No. 6,386,219). The Examiner also rejects claims 1, 3-8 and 13 under 35 U.S.C. §103(a) as allegedly being unpatentable over Barth et al. in view of Biegelsen et al. (U.S. Patent No. 5,971,355).

The applicants' claimed integrated electrofluidic system as now recited in claim 1 includes: 1) a support platform including a plurality of laminated layers, 2) an electronic control system mounted on the support platform, 3) a microfluidic system embedded in the platform and configured to define at least one electrofluidic component thereon and configured to circulate a fluid over surfaces of the at least one electrofluidic component, and 4) at least one electrical conductor carried by the platform for electrically interconnecting the electronic control system and the least one electrofluidic component.

The microfluidic system as now recited in independent claim 1 efficiently circulates a fluid over the various surfaces of the electrofluidic components, e.g., as shown by arrows 33, 35, 37, and 39 and sensors, such as embedded sensor 82. *See* Fig. 2 of the applicants' specification reproduced below:

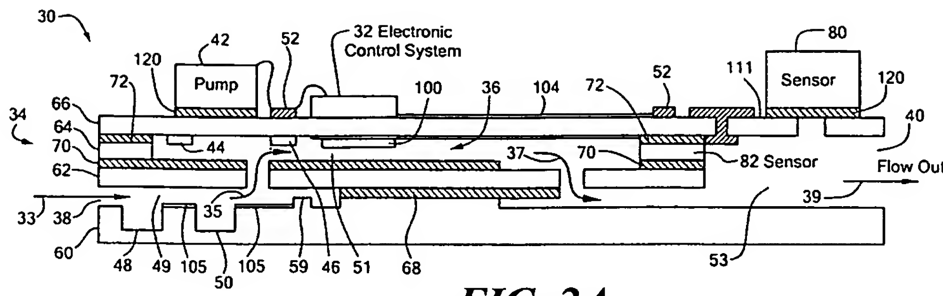

FIG. 2A

See also applicants' specification, page 11, lines 22-24.

In contrast, Barth et al. fails to teach or disclose a microfluidic system which circulates a fluid over the surfaces of at least one fluidic component. In fact, Barth et al. teaches and discloses a fluid handling system which ejects fluid from the system:

> In operation, a droplet 144, which has a typical volume of 35 picoliters (pl), is ejected from the fluid handling system 100 through droplet passthrough hole 142 after being ejected from the orifice 138 by ejection means 110. The ejection means 110 is typically an electrically heated resistor, which acts by explosive boiling of a liquid 146 to eject the droplet 144, although other ejection means such as piezoelectric means may also be used.

Col. 5, lines 7-15, emphasis added.

After the ejection is complete, the droplet flies through space and is deposited onto a substrate:

> After ejection of the droplet 144, it flies through space and is deposited on a substrate such as a glass slide (not shown) to form one sample point in a microarray (not shown).

Col. 5, lines 14-17, emphasis added

DR-352J
RJC/jmc

Barth et al. teaches and discloses delivering liquid 146 through capillary 140 to orifice 138 and then ejecting a small droplet from the system. To do that, Barth et al. relies on a deposition chip (108) which is attached to layers 118 and 120. Barth et al. teaches that the firing chamber is <u>walled off</u> by deposition chip 108 on its upper surface, by barrier 112 on its sides, and by sheet 118 on its bottom surface:

> <u>The firing chamber 148 is walled by the deposition chip 108</u> on its upper surface, by the barrier 112 on its sides, and by the sheet 118 on its bottom surface.

Col. 5, lines 21-24, emphasis added

Barth et al. also teaches and discloses that barrier 112 forms a <u>solid barrier against liquid flow</u> between hundreds of firing chambers which are laterally adjacent to one another and which are all adjacent to the deposition chip 108. *See* Col. 5, lines 44-49.

Barth et al. further teaches creating small capillaries 140 or 162, as shown in Fig. 2. Barth et al. relies on the small capillaries because multiple incoming liquid samples can be expensive and when large volumes of such samples are required in order to prime a deposition before its use, the deposition costs rise correspondingly. Thus, the goal of Barth et al. is to minimize the priming volume and to keep deposition costs low. *See* Col. 6, lines 26-33.

In contrast, the applicants' claimed electrofluidic system embedded in the support platform and defines at least one electrofluidic component on the microfluidic system and <u>circulates a fluid over the surfaces of the electrofluidic component</u>. This is a completely different structure and use than taught and disclosed by Barth et al.

Barth et al. also fails to teach or disclose a microfluidic system configured <u>to define at least one electrofluidic component thereon</u> as recited in applicants' independent claim 1.

Instead, Barth et al. attaches electrofluidic components after the format compression manifold layer with sheets 116 and 118 are bonded together. As disclosed by Barth et al., the first sheet 116 is laser manufactured with capillaries 162 and passed through holes 142 for each of capillaries 162. Then, second sheet 118 is laser machined with liquid access holes 136 and 134 and the orifice 138 for each of the capillaries 162. *See* Col. 7, lines 22-27. The FCM layers 116 and 118 are placed in contact with one another and layer 118 is placed in contact with rim 151. *See* Col. 7, lines 33-36. As taught by Barth et al. "MTM 102 and chip 108 are absent from the FCM lamination process". Col. 7, lines 36-39, emphasis added.

Thereafter, once the laminated assembly returns to room temperature, the first and second sheets 116 and 118 are left in a state of tension so that the first and second sheets 118 are flat and taut. The MTM 102 is then aligned and bonded with FCM 114 using adhesives. *See* Col. 7, lines 59-65. Then, deposition chip 108 can be aligned and bonded to FCM 114 via the barrier material 112:

> Deposition chip 108 can be aligned and bonded to FCM 114 via the barrier material 112 in a manner similar to that known for bonding of polyimide sheets containing orifices in the inkjet industry.

See Col. 8, lines 7-10, emphasis added.

Clearly, Barth et al. fails to teach or disclose a microfluidic system configured to define at least one electrofluidic component thereon. Instead, Barth et al. is simply layering various laminating layers together to form a capillary and then later attaching the deposition chip to that assembly.

Therefore, for at least the reasons stated above, Barth et al. fails to teach or disclose each and every element of the applicants' integrated electrofluidic system as recited in claim

1, namely, an electrofluidic system embedded in the platform having an input and an output configured to define at least one electrofluidic component thereon and configured to circulate a fluid over the surfaces of the at least one electrofluidic component. Accordingly, applicants' independent claim 1 and the dependent claims rejected by the Examiner which depend from that claim, are patentable and allowable under 35 U.S.C. §102(e).

As stated above, Barth et al. fails to teach or disclose a microfluidic system embedded in the platform and having an input and an output and configured to define at least one electrofluidic component thereon and configured to circulate a fluid over the surfaces of the at least one electrofluidic component. Biegelsen et al. also fails to disclose these features. Accordingly, the Examiner's rejections of claims 1, 3-8 and 13 under 35 U.S.C. §103(a) are traversed.

Each of Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associate, Joseph S. Iandiorio, collect in Waltham, Massachusetts, (781) 890-5678.

Respectfully submitted,

Roy J. Coleman
Reg. No. 48,863

DR-352J
RJC/jmc